



Canada-United States Law Journal

Volume 21 | Issue

Article 32

January 1995

The Effect of Environmental Regulation on Technological Innovation in Canada

Roger Cotton

Cara Clairman

Follow this and additional works at: <https://scholarlycommons.law.case.edu/cuslj>



Part of the [Transnational Law Commons](#)

Recommended Citation

Roger Cotton and Cara Clairman, *The Effect of Environmental Regulation on Technological Innovation in Canada*, 21 Can.-U.S. L.J. 239 (1995)

Available at: <https://scholarlycommons.law.case.edu/cuslj/vol21/iss/32>

This Speech is brought to you for free and open access by the Student Journals at Case Western Reserve University School of Law Scholarly Commons. It has been accepted for inclusion in Canada-United States Law Journal by an authorized administrator of Case Western Reserve University School of Law Scholarly Commons.

The Effect Of Environmental Regulation On Technological Innovation In Canada

*Roger Cotton**
*Cara Clairman***

TABLE OF CONTENTS

I. The Environment Industry	240
II. Environmental Regulation And New Technologies	242
A. CFCs	242
B. PCBs	245
C. Organochlorines	246
D. Summary	248
III. The Impact Of Environmental Regulation On The Competitiveness Of The Regulated	249
IV. Alternatives To Regulation	251
V. Conclusion	252

As society's tolerance for pollution - primarily a by-product of industry's activities - continues to decrease, despite recessions and a rightward shift in the political spectrum, increasing pressure is placed on governments to respond to this intolerance by imposing tougher standards on industry with respect to their pollution emissions. This fact remains despite the "rightsizing" of government and industry. In Canada, these tougher standards are usually put in place through the use of environmental regulations. Although there is some dispute with respect to the benefits of these regulations to the industries that are regulated, regulations requiring companies to either reduce their emissions or eliminate the use of certain products often open windows of opportunity for environmental entrepreneurs. In particular, new, more stringent regulations have encouraged the development and/or implementation of innovative technologies that enable industry to meet these requirements. In other words, an industry that relies on the creation of new and innovative environmental technologies, the "environment industry," has largely been created in response to the increasing demands placed on industry through regulation to reduce, control, or eliminate

* Partner and Head of the Environmental Law Group, Tory Tory DesLauriers & Binnington, Toronto, Canada.

** Associate, Environmental Law Group, Tory Tory DesLauriers & Binnington, Toronto, Canada.

some or all of the pollution that results from their business activities. The environment industry is now one of the fastest growing industries in Canada.

In this Article, we will first discuss the nature of the environment industry in Canada. Secondly, we will endeavour to explain the interrelationship of environmental regulation and the development of new technologies. In discussing Canada's regulatory regime, we will provide a brief overview of the division of powers between the federal and provincial governments with respect to environmental matters. This is followed by an examination of the regulatory framework applied to three pollutants - chlorofluorocarbons (CFCs), polychlorinated biphenyl (PCBs), and organochlorines. This discussion will focus on Ontario, Canada's most industrialized province, and is intended to demonstrate the potential effects of environmental regulation on the Canadian environment industry and on the competitiveness of that industry in the global marketplace. Thirdly, we will look briefly at the impacts of environmental regulation from the perspective of those industries being regulated. We will also briefly consider environmental protection regimes that could replace regulation as a means of both driving innovation in environmental technologies and protecting the environment from some of the impacts of industrial activities. In conclusion, we will comment on some of the initiatives being taken by both the Canadian and Ontario governments to provide additional incentives for the development of new environmental technologies.

I. THE ENVIRONMENT INDUSTRY

The Canadian environment industry is made up of companies that provide goods and services associated with pollution control and prevention, remediation, 3R's, energy, and resource conservation, as well as the measuring and monitoring of environmental impacts.¹ A 1992 study conducted by Ernst & Young found that the industry was made up of over 3,000 companies, mainly small businesses, employing approximately 70,000 people and generating annual revenues of six to eight billion Canadian dollars.² A more recent report indicates that the Canadian environment industry generates eleven billion dollars in revenue per year, and is composed of 4,500 small and medium-sized businesses employing over 150,000 people.³ By either of these estimates, the environment industry is one of the top five employers in Canada.⁴

¹ Gary Gallon, *Environment Industries are the Economic Future*, CANADIAN ENV'T INDUS. ASSOC. NEWS, Fall, 1993, at 1. This is not meant to be an exhaustive list.

² ERNST & YOUNG, HUMAN RESOURCES IN THE ENVIRONMENT INDUSTRY iii (1992).

³ ENVIRONMENT CANADA & INDUSTRY CANADA, A STRATEGY FOR THE CANADIAN ENVIRONMENTAL INDUSTRY 6 (1994) [hereinafter ENVIRONMENT CANADA].

⁴ Gary Gallon, *Environmental Industries: Part of the New Canadian Economy*, NAT'L ROUND TABLE REV. 9, 10 (1993).

Environmental legislation and regulations have, based on numerous reports, been found to be one of the most significant factors driving the demand for environmental products and services, not just in Canada, but around the world.⁵

An Ontario study conducted in 1992 concluded that the future of Ontario's environment industry would be shaped by changes in federal and provincial regulation.⁶ The study noted a trend toward increasingly tougher standards in the areas of water pollution control, ground level ozone emissions, solid waste reduction, and hazardous waste clean-up, as well as an emphasis on new pollution prevention processes rather than "end of the pipe" solutions.⁷

A recent survey of Canadian companies found that ninety-five percent of respondents felt compliance with regulations was the most important motivating factor in managing their businesses' environmental issues.⁸ Another survey of 175 suppliers of technology-based products and services found that regulations were generally perceived to be a positive factor in the development of environmental technologies.⁹

This view of regulation has also been expressed by the former Minister of the Environment in Ontario, who stated, "tighter government regulations and increased environmental awareness by business and consumers will keep the environmental protection industry growing at an estimated fourteen percent per year for the next five years."¹⁰ A more modest estimate indicates a growth rate of eight percent per year, still well above the rate at which the Canadian economy is growing.¹¹

In summary, the environment industry appears to be making an increasingly significant contribution to the Canadian economy. Further, various studies and surveys provide support for the proposition that regulation, imposing tougher standards on industry, is one of the driving forces behind the development of new environmental technologies and thus is a driving force behind the growth of the environment industry in general. Whether this proposition is correct, or the most effective approach, is the subject of considerable debate. We do not question the

⁵ *Id.*

⁶ ERNST & YOUNG, STUDY OF THE ONTARIO ENVIRONMENTAL PROTECTION INDUSTRY 51 (1992) (prepared for the Ontario Ministry of the Environment) [hereinafter STUDY OF THE ENVIRONMENT INDUSTRY].

⁷ *Id.* Other factors found to play a role in the growth of the environment industry include economic growth, population growth, increasing consumer demand for green products, and increasing corporate environmental consciousness.

⁸ KPMG, CANADIAN ENVIRONMENTAL MANAGEMENT SURVEY i (1994).

⁹ D.J. DOYLE, BUILDING A STRONGER ENVIRONMENTAL TECHNOLOGY EXPLOITATION CAPABILITY IN CANADA 38 (1992).

¹⁰ See ONTARIO MINISTRY OF THE ENVIRONMENT, RELEASE, ENVIRONMENTAL PROTECTION INDUSTRY TO GROW BY 14% FOR THE NEXT FIVE YEARS (1992). Ruth Grier was the Minister of the Environment at the time this statement was made.

¹¹ Gallon, *supra* note 4, at 9.

proposition, and will assume its validity in this Article. We will now look at some examples that highlight the relationship between regulation and the development and/or implementation of innovative environmental technologies.

II. ENVIRONMENTAL REGULATION AND NEW TECHNOLOGIES

Before discussing specific examples of environmental regulation in Canada, it is first necessary to set out how powers are divided between the provincial and federal governments. The Constitution Act, 1867,¹² in sections 91, 92, and 92A, gives each level of government the jurisdiction to deal exclusively with certain classes of matters. Unfortunately, environmental matters post-date this division of powers and do not fit neatly under any one head of power listed in that Act. This means that some environmental matters fall within classes designated as areas of federal responsibility, some are the provinces' responsibility, and some overlap.

Generally, the areas of federal jurisdiction that may relate to environmental matters include navigation and shipping, fisheries, federal lands, and lands reserved for native peoples. Environmental matters also come within provincial jurisdiction under laws respecting property and civil rights in the province, and matters of a local or private nature.¹³ The responsibility to deal with property matters means that regulations aimed at controlling pollution emissions will generally, but not exclusively, be enacted by the provinces. For this reason, most of the following discussion will focus on provincial environmental regulation in Ontario.

A. CFCs

As far back as 1974, scientists began to speculate on the links between damage to the ozone layer and the use of CFCs in industry. The scientific community, through intensive study, was able to confirm the theory that CFCs released at the earth's surface interacted with ozone molecules in the atmosphere causing those molecules to break apart, resulting in thinning, and in some cases the creation of gaps or "holes," in the ozone layer.¹⁴

The Vienna Convention on the Protection of the Ozone Layer was signed in March, 1985 by representatives from twenty countries. This agreement did not set out targets to be met in the reduction of CFCs, but required cooperation between countries in researching and monitor-

¹² Constitution Act, 1867, 30 & 31 Vict., ch. 3 (1867) (Eng.).

¹³ For more information, see Roger Cotton & John S. Zimmer, *Canadian Environmental Law: An Overview*, CANADA-U.S. L.J. 63 (1992).

¹⁴ GARY GALLON, GREEN INDUSTRIES WORKING GROUP - PROGRESS REPORT, PART IV 46 (1993) (prepared for Third National Stakeholders' Assembly).

ing the relationship between CFCs and the destruction of the ozone layer. The scientific community made it clear that greater efforts were required if the ozone layer was to be protected. This led to the signing of the Montreal Protocol by forty-seven countries, which required that the use of ozone depleting substances (ODS) be reduced by fifty percent by 1992. This Protocol came into effect January 1, 1989.¹⁵

As the urgency of the situation became more apparent, an agreement was struck by the participating countries to accelerate the requirements of the Montreal Protocol. In June, 1990, these countries agreed to a 100% ban of ODS by the year 2000 and by 2010 for developing countries. In 1992, a further acceleration to phase out the production and use of new CFCs by January 1, 1996 was agreed upon.¹⁶

In response to the Montreal Protocol, Ontario, as well as the other Canadian jurisdictions, enacted a number of regulations that require industry to either control their CFC emissions or to eliminate the use of new CFCs in their activities.¹⁷ One of the requirements of this regulatory scheme was, and still is, to require companies to capture and recycle CFCs contained in stationary refrigeration and air-conditioning units.¹⁸ A pumping system was available to collect the CFCs under pressure, but no technology was available that would allow the gas that had been collected in pressurized containers to be extracted in a pure state, meeting a virgin product specification, and reused. Also, a pumping system would not allow collection of the gas from diluted streams such as emissions occurring during purging, vacuum evacuation, and leak testing). The need for such a technology ultimately led to the development of the "Halozone" technology. In simple terms, this technology allows for the capture of CFCs, from either concentrated or diluted streams, in a non-pressurized container called the Blue Bottle®. The Blue Bottle® cylinder can be connected directly to the refrigeration or air-conditioning unit, meaning that instead of venting the gas to the atmosphere, it is vented directly into this special container. Since the CFCs are not under pressure in the Blue Bottle®, these containers are relatively safe to transport and are therefore not subject to Canada's Transportation of Dangerous Goods Regulations.¹⁹ Once the CFCs are collected in the Blue Bottle®, they can be transported to the Halozone Central Reprocessing Facility. The CFCs are then removed from the Blue Bottle® using heat and other methods, leaving both the pure CFCs

¹⁵ *Id.* at 47.

¹⁶ *Id.*

¹⁷ The current regulatory scheme includes R.R.O. 1990, Reg. 356, O. Regs. 189/94, 323/94 and 413/94.

¹⁸ O. Reg. 189/94. Companies are prohibited from discharging refrigerant into the natural environment.

¹⁹ Leon Rucker, *How Ozone Protection Regulations Encourages Technical Innovation - A Case Study*, THE "NEW ECONOMY" - GREEN NEEDS AND OPPORTUNITIES 3 (1994).

and the regenerated Blue Bottle® cylinders available for re-use.²⁰ Larger size Blue Bottles® are now available to deal with commercial and industrial equipment containing larger quantities of CFCs.

The advent of this technology made it possible for companies to meet the demands of regulations designed to achieve the requirements of the Montreal Protocol, while at the same time making it possible for companies to keep existing cooling equipment in operation. In fact, the company that developed the Blue Bottle® technology, is working on other technological advances to assist companies in complying with regulations that cover other aspects of refrigerant recovery and storage.²¹

The impact of this type of regulatory scheme on technological innovation was recognized by those involved in the development of the Blue Bottle®:

Had it not been for documents and legislation like the Montreal Protocol - which is mandatorily phasing out CFC production and manufacturing, we may not have gotten off our laurels and thoroughly investigated the potential of looking at new ways to condense, transfer, heat, and use less refrigerant gases that we have been traditionally used to for over forty years.²²

This example demonstrates the benefit of "progressive" environmental regulations, that is, regulation that requires progress on an environmental issue, in terms of encouraging technological innovation. In addition to the benefit of creating a product that allows for compliance with regulations at home, innovative technology can be exported to other countries that have not yet developed their own technologies. In fact, Halozone currently sublicenses its technology both in Canada and overseas. The advantages of progressive environmental legislation/regulation, and the disadvantages of lagging behind, can be summarized as follows:

Environmental legislation not only drives demand for environmental products and services, it can also provide a domestic industry with a competitive advantage. Progressive legislation allows a domestic industry to develop its expertise ahead of foreign competition and gives that industry an advantage in entering export markets. Conversely, a lack of domestic legislation may deprive the industry of the ability to

²⁰ Dusanka Filipovic, *Recovery, Reclaiming and Recycling of Halogenated Hydrocarbons*, in FIRST NORTH AMERICAN CONFERENCE AND EXHIBITION ON EMERGING CLEAN AIR TECHNOLOGIES AND BUSINESS OPPORTUNITIES 3 (1994).

²¹ See *supra* note 18.

²² Michael A. Steele, *Montreal Protocol: Driving the CFC Conversion Business* in EMERGING CLEAN AIR TECHNOLOGIES AND BUSINESS OPPORTUNITIES 1 (1994). Michael Steele is the president for Thermco Canada, a division of Halozone Recycling Inc. Thermco's business objective is to reduce the volume metric use requirement of ozone depleting gases by 90% while guaranteeing 100% containment of the remaining 10%.

develop its expertise and leave it open to competition from abroad.²³

The next examples demonstrate the impediments to the development and implementation of new environmental technologies that can exist when our regulatory framework lags behind other jurisdictions.

B. PCBs

The impact of PCBs on environmental health has been studied and documented for more than twenty years. PCBs have been shown to bioaccumulate, meaning that their concentrations increase as they are transferred up the food chain. During the 1970s, scientists linked reproductive problems in fish-eating birds with high concentrations of PCBs, and some studies indicated that a connection existed between the ingestion of PCBs and cancer and birth defects in humans. A public outcry resulted in a Canada-wide ban against the import or manufacture of PCBs in 1976.²⁴ Until the early 1980s, however, there were no regulations to deal with PCBs already in existence in the country.

Both the governments of Canada and Ontario, as well as most other provinces, have now enacted regulations setting out how PCBs should be managed once they are taken out of service.²⁵ These Regulations set out storage requirements for PCBs, including provisions dealing with access to the storage site, maintenance and inspection, labeling requirements, fire protection, and emergency procedures, safety, record keeping, and reporting requirements.²⁶ The Regulations also restrict the movement of PCB wastes both within and between PCB storage sites.

As the Canadian regulatory framework deals only with storage, there is still no requirement to actually dispose of high level PCBs in any Canadian jurisdiction. Until recently, there were no permanent facilities to destroy PCBs, which led to the stock piling of PCBs at sites all across Ontario and throughout the country.²⁷

Even without a regulatory framework to force those storing PCBs to dispose of them, liability issues reinforced the need for a process that could safely destroy PCBs, either at a centralized facility or on-site.

²³ Gallon, *supra* note 1, at 10.

²⁴ Daniel Stoffman, *The Big Clean-Up* REPORT ON BUS. MAG., Nov. 1994, at 45-56.

²⁵ SOR/92-507; R.R.O. 1990, Reg. 362.

²⁶ Ontario enacted its first PCB storage regulation in 1982, but the federal government did not follow suit until 1992. The federal Regulation and the Ontario Regulation are similar but not identical. The provisions discussed come from the Ontario Regulation.

²⁷ Alberta has an incinerator that can destroy PCBs, and that province has very recently opened its borders to PCBs from other provinces. Due to the fact that this alternative is new and the transportation costs are very expensive, it is difficult to estimate the impact it will have on the stock piles of PCBs in other provinces. As well, some limited on-site PCB destruction has occurred for low-level PCB materials.

Many solutions were proposed, but few succeeded.²⁸ For example, one company, ELI Eco Logic Inc., developed a process that is able to destroy PCBs in a closed-loop process without incineration. One of the advantages of this technology is that it can be transported to the site rather than trucking the PCBs to a central facility, eliminating the cost of transportation and the risk of transportation accidents. In addition, since there is no incineration, there is no risk of the contaminants being disbursed into the air. This is important in Canada, particularly in Ontario, due to the fact that our regulators take a negative view of incineration.²⁹ It also appears to be much lower in cost than incineration.

ELI Eco Logic Inc. had a great deal of difficulty getting this new technology accepted in Canada. Although it had a successful demonstration in Ontario at Hamilton Harbour in 1991, the Eco Logic Process was not received with much enthusiasm in Canada until a U.S. - E.P.A. sponsored demonstration in 1992 proved a success and was published by the E.P.A. in July, 1994. In fact, ELI Eco Logic Inc. got its first contract to use this technology from the West Australian government in June, 1994, not in Canada. Dr. Doug Hallett, Eco Logic's president and the inventor of this technology, attributes these difficulties in Canada to weak enforcement of PCB disposal regulations, and the lack of regulatory support for the use of new technologies.³⁰ Although ELI Eco Logic Inc. has now obtained major industrial contracts in Canada and in the United States, the difficulties experienced by this company demonstrate how the lack of regulation can potentially stall the implementation of innovation in environmental technology.

C. *Organochlorines*

The forest industry is one of the largest industries in Canada, employing approximately 239,000 people.³¹ Further, Canada is the world's largest trader in market pulp with a global market share of twenty-

²⁸ R.R.O. 1990, Reg. 352, the Mobile PCB Destruction Facility Regulation sets out rigorous standards for facilities that are used to destroy only low-level PCB wastes. A proposal to build a publicly funded hazardous waste facility in Ontario that would be able to destroy high level PCBs was recently turned down by the Ontario Ministry of Environment and Energy.

²⁹ Ontario, and more specifically Toronto, is in the midst of a "garbage crisis." In the search for waste management solutions, Ontario's NDP (New Democrat) government rejected the use of incineration as a possible alternative. In fact, R.R.O. 1990, Reg. 347 (a general waste management regulation) provides at §§ 12.1(1) that no municipal waste incinerator site shall be established or operated in Ontario (some exceptions are set out in §§ 12.1(2)-(6)). Although this ban is still in effect, the Progressive Conservative government, elected June 8, 1995, is proposing that incineration be put back on the table as a potential municipal waste management option.

³⁰ Stoffman, *supra* note 24, at 51.

³¹ CANADIAN PULP AND PAPER ASSOCIATION, SUBMISSIONS TO THE STANDING COMMITTEE ON ENVIRONMENT AND SUSTAINABLE DEVELOPMENT CONCERNING THE REVIEW OF THE CANADIAN ENVIRONMENTAL PROTECTION ACT 2 (1994) [hereinafter CANADIAN PULP AND PAPER ASS'N].

eight percent.³²

The effects of the use of chlorine-based chemicals in the bleaching process at pulp mills has been the subject of much debate worldwide, but particularly in Canada. Out of 145 pulp and paper mills in Canada, forty-six use chlorine in their bleaching process.³³ Their effluent contains "organochlorines," or organic compounds of chlorine. Environmental groups, such as Greenpeace in Canada, have been pushing for chlorine-free mills for quite some time, due to their concerns about the persistence and toxicity of organochlorines.³⁴ However, the regulations have not required pulp and paper mills to eliminate chlorine as yet. Over the years, regulations imposed on pulp mills have, however, become more and more restrictive with respect to the chlorine content of their effluent. For example, a federal regulation enacted under the Canadian Environmental Protection Act in December of 1991 required that dioxins and furans, the most toxic of the organochlorines, be virtually eliminated from pulp mill effluent by 1994.³⁵

Pulp and paper mills in Canada have, in fact, made significant strides toward the virtual elimination of dioxins and furans in their effluent.³⁶ However, environmental groups such as Greenpeace and Pollution Probe have more recently asserted the view that all organochlorines are dangerous, and have been lobbying for the reduction and eventual elimination of "AOX," a term used to describe a method of measuring chlorinated compounds.³⁷ The pulp and paper industry in Ontario and across Canada is of the view that the dangers of organochlorines have not been scientifically substantiated. They argue that not all organochlorines are toxic or bioaccumulate, and that there is no evidence that AOX below 1.5 kg/tonne of pulp is harmful to the environment. Further, by virtually eliminating dioxins and furans, they have gone a long way toward reducing AOX. In addition, they argue that their industry exports eighty percent of its production, and that a goal of zero discharge of AOX will have a negative impact on competitiveness in the global marketplace.³⁸

Despite the controversy over the virtues of regulating AOX, Ontario enacted a Regulation to tackle this issue in 1993.³⁹ This Regulation

³² BRIAN HULL, EFFLUENT FROM PULP MILLS USING CHLORINE 3 (1992).

³³ *Id.* at 5.

³⁴ *Id.* at 9.

³⁵ SOR/92-269. Regulation SOR/92-267, enacted under the Fisheries Act (another federal Act), has placed limits on effluent containing of substances that consume oxygen and suspended solids.

³⁶ ONTARIO FOREST INDUSTRIES ASSOCIATION, POSITION ON THE DRAFT MISA EFFLUENT REGULATION FOR THE PULP AND PAPER SECTOR - A SUBMISSION TO THE HON. BUD WILDMAN, MINISTER OF THE ENVIRONMENT 2 (1993) [hereinafter ONTARIO FOREST INDUSTRIES ASS'N].

³⁷ Hull, *supra* note 32, at 7.

³⁸ *Id.* at 7, 11; ONTARIO FOREST INDUSTRIES ASS'N, *supra* note 36, at 3.

³⁹ Effluent Monitoring and Effluent Limits - Pulp and Paper Sector, O. Reg. 760/93. This

requires all Ontario mills that discharge directly to surface waters to monitor and to report on their progress in reducing the level of AOX in their effluent discharges.⁴⁰

Most players in the pulp and paper industry see the Ontario regulators eventually driving industry towards chlorine-free mills. Some mills already have succeeded. Despite the fact that technology to become chlorine-free has been available since 1913, it appears that the trend in regulation is the primary motivator for companies that are seriously considering becoming chlorine-free.⁴¹

We are now faced with a situation where the pulp and paper industry in other jurisdictions has already been required to become chlorine-free. This means that those jurisdictions have developed and put in place the technology that allows them to meet that requirement. This also means that those jurisdictions can provide Canadian companies with the technology that will allow these companies to meet or exceed the new regulatory requirements. As a result, we are more likely to import this existing technology rather than developing Canadian technology. For example, many pulp mills in Canada are currently using an effluent treatment process that was developed in Scandinavia.⁴² This example demonstrates how, in some situations, environmental regulations that lag behind other jurisdictions can be detrimental to the process of innovation and the growth of the environment industry in Canada.

D. Summary

The three examples set out above demonstrate some of the different ways that environmental regulation can influence innovation in environmental technologies. If regulations impose tough standards, or suggest a trend toward tougher standards, technologies are more likely to be developed to enable industry to comply with those standards. If those standards are not in place, technologies may be developed but will not necessarily be implemented until the regulatory framework requires such implementation. Finally, if our environmental regulations are less stringent than those of other jurisdictions, we may be more likely to import foreign technologies if and when our regulatory regime

regulation does not apply to mills which discharge to a municipal sewer for treatment. This regulation requires a staged reduction in AOX emissions, as follows: 2.5 kg/tonne by February 23, 1994; 1.5 kg/tonne by December 31, 1995; and 0.8 kg/tonne by December 31, 1999. Detailed monitoring and reporting requirements are set out.

⁴⁰ See Edward Turner, *Pulp and Paper Regulations in Ontario*, ENVIRONMENTAL LAW AND MANAGEMENT FOR THE CANADIAN FOREST INDUSTRY (Canadian Institute 1994).

⁴¹ Ron Larocque & Alan Pryor, *Using Ozone in the Pulp and Paper Industry*, ENVIRONMENTAL SCIENCE AND ENGINEERING, July 1994, at 67.

⁴² Ron Doering, *Investing in Green Industries: Opportunities and Problems*, in TECHNOLOGY TRANSFER CONFERENCE 2 (1993).

“catches up.”

III. THE IMPACT OF ENVIRONMENTAL REGULATION ON THE COMPETITIVENESS OF THE REGULATED

Despite the apparent growth of the environment industry in Canada, we have only a 4.6% share of the \$240 billion global market for environmental goods and services.⁴³ Some would argue, as discussed above, that this is largely due to the fact that regulations have not been as stringent as some other jurisdictions, so that technological advancements occur in those jurisdictions first. A 1992 survey discussed earlier indicates that many of Ontario's environmental industrialists think that Ontario environmental standards lag behind standards in the United States, giving U.S. firms involved in the development of environmental technologies a leading edge.⁴⁴ In fact, when asked what could be done to improve Ontario's competitiveness in the environment industry vis-à-vis the United States, the most frequent response was that Ontario should make efforts to ensure it does not lag behind the United States in adopting and enforcing regulations.⁴⁵

This is all well and good for the environment industry, but what about the industry that these regulations are being imposed on? Does environmental regulation have an effect on the competitiveness of these industries? This is obviously a controversial subject, described by the regulators as follows:

People concerned with economic growth say that too much regulation will impose excessive costs on business, industry and the economy as a whole. These costs, they argue, can stifle economic growth and reduce living standards. Environmental advocates claim that too little regulation and environmental protection will result in the exhaustion or destruction of our natural and environmental resources leading to economic losses and reduced living standards.⁴⁶

The Ontario Forest Industries Association takes the view that market forces, not regulation, should drive technology. For example, they estimate that it will cost their industry an additional \$1.2 billion to achieve the “chlorine-free” goal “with neither science nor environmental need to justify the investment.”⁴⁷ Another report argues that environmental regulation adds to costs but does not influence revenues, leaving fewer dollars to invest in other projects and reducing competi-

⁴³ Gallon, *supra* note 23, at 46.

⁴⁴ STUDY OF THE ENVIRONMENT INDUSTRY, *supra* note 6, at 167.

⁴⁵ *Id.* at 187.

⁴⁶ Atif Kubursi & Jack A. Donnan et. al, *The LINK Model: Integrating the Economy and the Environment*, TECHNOLOGY TRANSFER CONFERENCE 1 (1993).

⁴⁷ ONTARIO FOREST INDUSTRIES ASS'N, *supra* note 36, at 3.

tiveness in global markets.⁴⁸ The Canadian Pulp and Paper Association argues that regulation can and does have a significant impact on the competitiveness of their industry. They stress the need for more predictability in regulation, less overlap between federal and provincial regulations, and better cost-benefit analysis of the impact of proposed regulations.⁴⁹

A recent regulatory review conducted by Environment Canada tackled this issue, but was inconclusive due to the lack of data available in Canada.⁵⁰ This review did identify, not surprisingly, that some industries or sectors feel the impact of environmental regulation more than others. Further, some specific differences between the regulatory regime imposed on industry in Canada and the United States were found to have negative consequences for Canada. For example, Canada's PCB regulations encourage long-term storage. This type of regime leads to increased costs and an increased risk of accidents due to the prolongation of dealing with eventual destruction and disposal. Companies in the United States are not subject to these costs because, in general, PCBs may not be stored for more than one year.⁵¹

A recent Ontario study on the effect of environmental regulations on the competitiveness of industry in Ontario found "no consistent evidence that Ontario industrial productivity has been adversely affected by changes in pollution intensity."⁵² By relating pollution intensity to environmental regulations, the study found that these regulations did not appear to have an effect on industrial productivity. By looking at relative productivity, the study found that Ontario's competitiveness was not likely harmed by provincial environmental protection programs.

Of course, it is difficult to evaluate the economic impact of environmental regulations on the regulated industries due to, among other problems, the problem of quantifying the "cost" of pollution. It is beyond the scope of this Article to fully investigate, and come to any conclusions on, the relationship between environmental regulation and competitiveness. There clearly are situations where environmental regulations imposed on industry have resulted in substantial expense to that industry which could affect competitiveness. However, industry has often responded by developing "compliance strategies that realized some offsetting benefits, such as revenue from sale of recovered by-

⁴⁸ Hull, *supra* note 32, at 4.

⁴⁹ CANADIAN PULP AND PAPER ASS'N, *supra* note 31, at 4 & 17.

⁵⁰ ENVIRONMENT CANADA, ENVIRONMENTAL PROTECTION REGULATORY REVIEW 11-14 (Discussion Document, Nov. 1993).

⁵¹ *Id.*

⁵² Ken Watson et al., *Are Environmental Regulations Dragging Down Ontario Industrial Competitiveness*, TECHNOLOGY TRANSFER CONFERENCE 5 (1993).

products or reduced input costs.”⁵³

IV. ALTERNATIVES TO REGULATION

It is safe to say that although the long-term impacts of environmental regulations on the regulated industry are unclear, there does appear to be consensus with respect to the benefits to the environmental industry of tougher environmental regulations. The conclusion that environmental regulations often drive technological innovation and allow Canada to be competitive in the global environment industry presupposes that environmental protection measures will be implemented using regulations. Of course, this is descriptive of how such measures are put in place in Canada. However, many economists have argued that regulation is not the best way to encourage industry to reduce the pollutants that they emit. Some argue that market incentives are better than regulations with respect to minimizing costs and stimulating innovation.⁵⁴ The Canadian government recently produced a discussion paper looking at economic instruments as alternative tools of environmental protection. Examples of such economic instruments include effluent charges, user charges, and other tax measures. It was concluded that these types of economic instruments are advantageous because:

[T]hey can be less economically intrusive and distorting, allowing decision-makers the flexibility to find the most cost effective means to achieving environmental goals. They can also provide an ongoing economic incentive to cut back pollution and to develop and use new technology and processes to control pollution.⁵⁵

Studies have indicated that certain types of economic instruments are better suited to certain types of problems. Therefore it is important to consider a number of factors such as environmental effectiveness, realization of economic benefits, international competitiveness, distributional impacts, transition and adjustment costs, administrative and compliance costs, jurisdiction, consistency with other government policies, and industry and public acceptability in deciding which instrument is most appropriate.⁵⁶

By putting a price on pollution through the use of a tax, companies may have more incentive to invest in processes and products that cause

⁵³ *Id.*

⁵⁴ Jack L. Knetsch, *Environmental Economics*, ENVIRONMENTAL LAW: AN INTENSIVE SHORT COURSE FOR PRACTITIONERS 32 (1992).

⁵⁵ GOVERNMENT OF CANADA, CANADA'S GREEN PLAN, ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL PROTECTION 69 (Discussion Paper, 1992) [hereinafter CANADA'S GREEN PLAN].

These same points were made in J.A. Cassils, EXPLORING INCENTIVES: AN INTRODUCTION TO INCENTIVES AND ECONOMIC INSTRUMENTS FOR SUSTAINABLE DEVELOPMENT 9 (Discussion Paper, Mar. 1993).

⁵⁶ CANADA'S GREEN PLAN, *supra* note 55, at 19-22.

less pollution. Further, the costs associated with a tax would likely be passed on to consumers. Consumers will tend to buy the cheaper product, which would, if one follows through this line of reasoning, be the product that causes less pollution. This would mean companies that succeed in creating environmentally superior technologies would be rewarded. The main difficulty associated with this system relates to determining the level at which these charges should be set.⁵⁷

Other types of economic incentives include tradable permits, market intervention, liability insurance, subsidies, investment incentives, consumer incentives, information incentives, and the list goes on.⁵⁸ Some authors argue that a combination of regulations and economic instruments designed to deal with specific pollution problems would likely produce better results than regulations alone.⁵⁹

Once again, it is beyond the scope of this Article to provide a full exploration of the potential uses of economic instruments in environmental protection. This cursory look at economic incentives as a replacement for, or to be used in combination with, regulations is intended to demonstrate that other systems of environmental protection could provide the environment industry with the same benefits as the current regulatory system. Other types of environmental protection regimes might be able to replace regulation in encouraging the development of new technologies that can be used in Canada and can be exported around the world.

V. CONCLUSION

One recent report indicated, perhaps obviously, that the largest exporters of environmental technologies are those countries with the most advanced environmental regulatory framework. That report went further to say that in order to be competitive in the global environment industry, Canada "must provide industry with a well-regulated and highly competitive domestic market and policy frameworks for environmental protection."⁶⁰ One must recognize, however, that regulations are only one of many factors that can play a role in promoting innovation in the environment industry. For example, problems in receiving financial backing, marketing barriers, as well as technological barriers, can also hamper such innovation.⁶¹ Recognizing the significance of

⁵⁷ Knetsch, *supra* note 54, at 32-33.

⁵⁸ Cassils, *supra* note 55, at 10-12.

⁵⁹ DAVID W. PEARCE & R. KERRY TURNER, *ECONOMICS OF NATURAL RESOURCES AND THE ENVIRONMENT* 104 (1990). These authors note that taxes are inferior to regulations when the pollutant is so dangerous that it must be banned.

⁶⁰ ANN FOUILLARD, *EMERGING TRENDS IN ISSUES IN CANADA'S ENVIRONMENTAL INDUSTRY* 23 (Discussion Paper, Mar. 1993).

⁶¹ Doyle, *supra* note 9, at 39. These findings resulted from a survey of 175 companies working in the environment industry.

these additional barriers, a number of government programs, both federal and provincial, have been developed to provide additional assistance to those companies involved in "green industry."⁶² These programs are intended to assist in technology development, business development, and trade promotion by providing research and development funding as well as government support services.

Government programs aimed at encouraging the growth of the environmental industry, although helpful, do not appear to provide the same kind of incentive to implement innovative environmental technologies that a regulatory framework seems to provide. The three examples discussed above indicate that stringent regulations often lead to the development of new innovative technologies designed to meet these regulatory challenges. Further, a regulatory regime that lags behind that of other jurisdictions is perceived to be a barrier to innovation and to the ability to compete in the global environment market. This may mean that in order for Canada to maintain or improve its position in the international environment industry, Canada will be required to remain at the forefront in the development and implementation of tough environmental regulations.

⁶² See ENVIRONMENT CANADA, *supra* note 3, and ONTARIO MINISTRY OF ENVIRONMENT AND ENERGY, ONTARIO'S GREEN INDUSTRY STRATEGY (1994) for two examples of these government programs.

